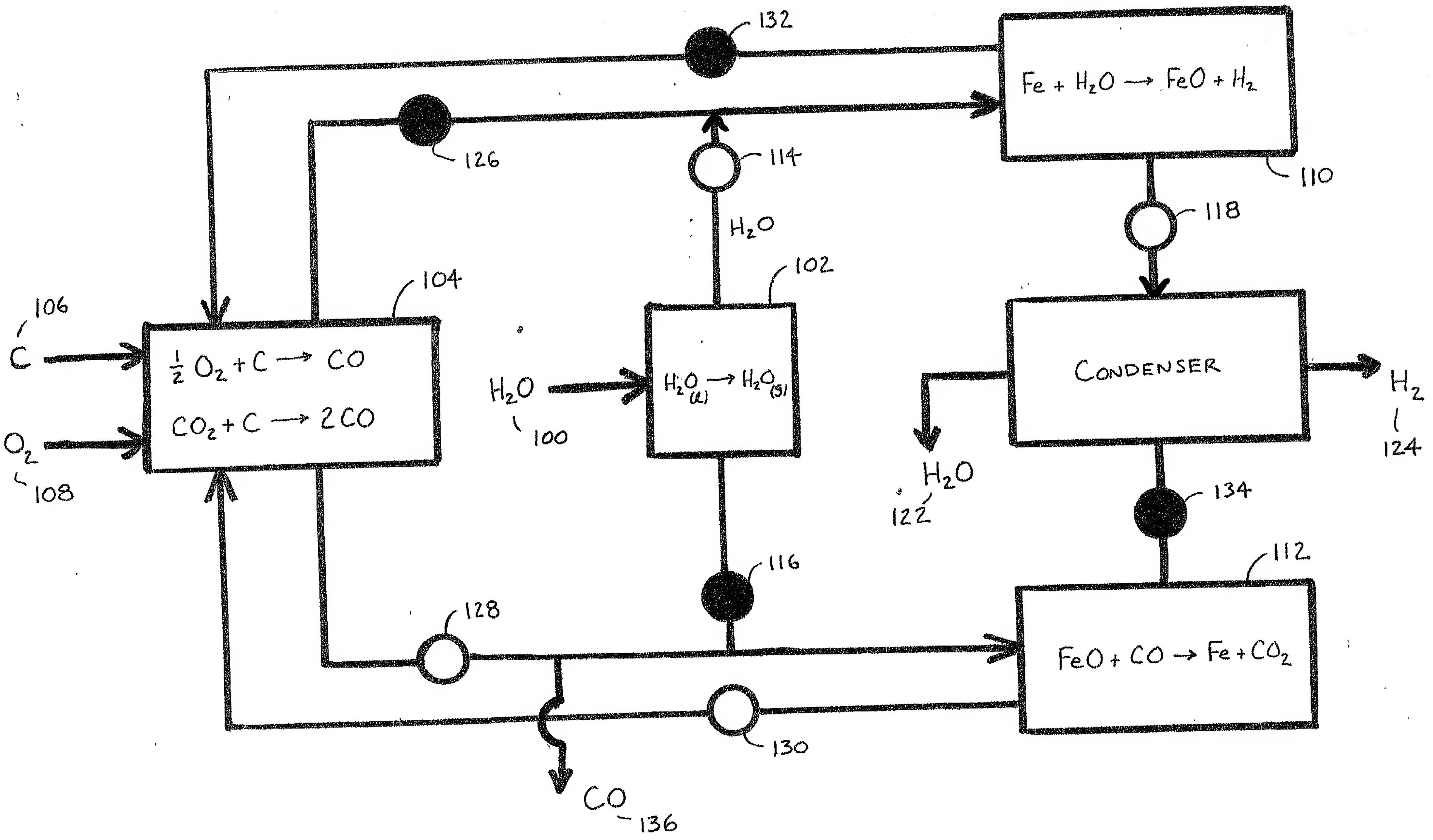
132
Fe + $H_2O \longrightarrow FeO + H_2$
126
114
110
118
H_2O
102
104
106
C
$\frac{1}{2}O_2 + C \longrightarrow CO$
$CO_2 + C \longrightarrow 2CO$
O_2
108
H_2O
100
$H_2O_{(l)} \longrightarrow H_2O_{(s)}$
CONDENSER
H_2
124
H_2O
122
134
116
112
128
$FeO + CO \rightarrow Fe + CO_2$
130
CO
136

Fig. 1

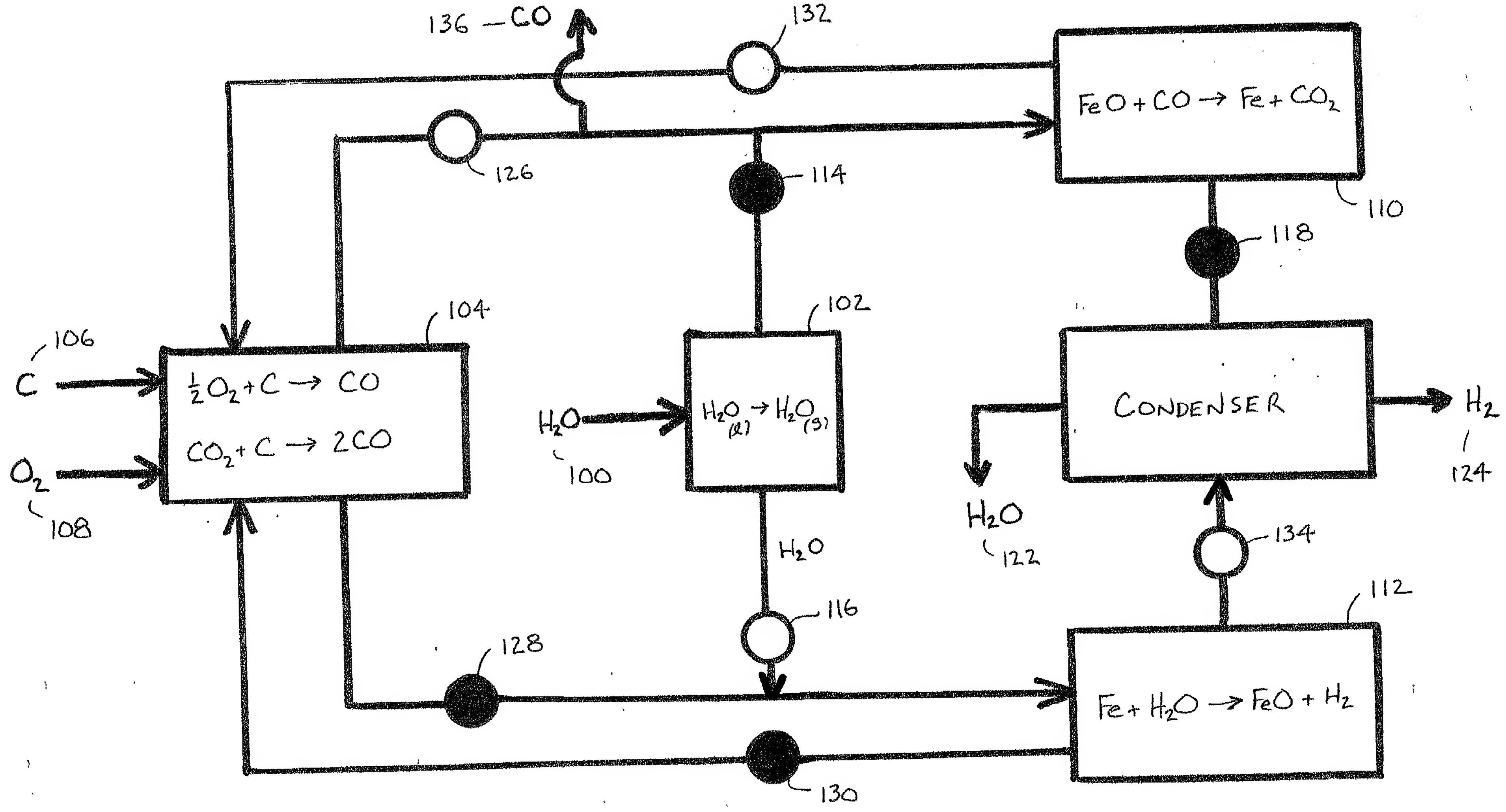
136 — CO
132
126
114
110
$FeO + CO \rightarrow Fe + CO_2$
118
104
102
106
C
$\frac{1}{2}O_2 + C \rightarrow CO$
$CO_2 + C \rightarrow 2CO$
O_2
108
H_2O
100
$H_2O_{(l)} \rightarrow H_2O_{(g)}$
CONDENSER
H_2
124
H_2O
122
H_2O
134
116
112
128
$Fe + H_2O \rightarrow FeO + H_2$
130

Fig. 2

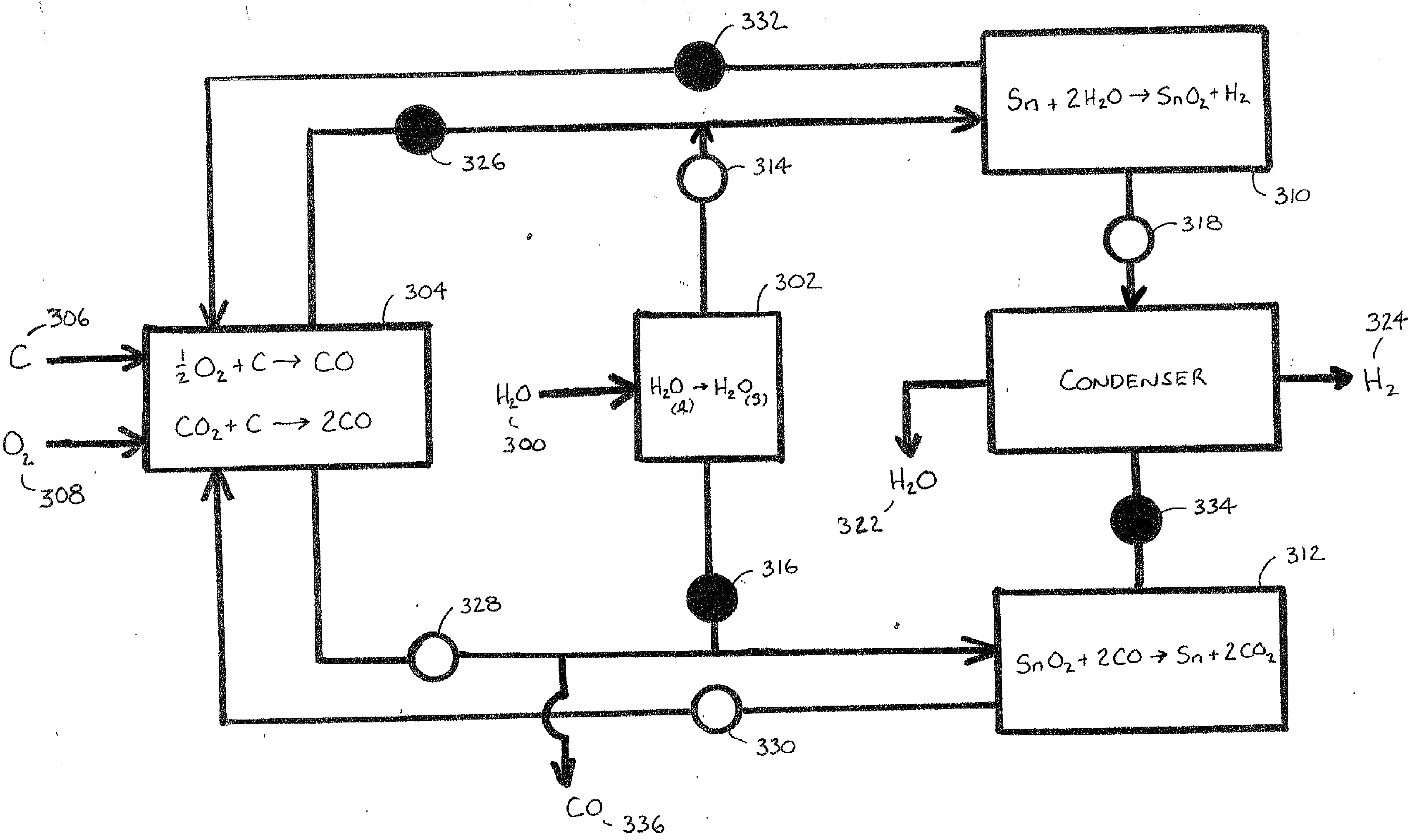
332
326
314
310
$Sn + 2H_2O \rightarrow SnO_2 + H_2$
318
304
302
306
C
308
O_2
$\frac{1}{2}O_2 + C \rightarrow CO$
$CO_2 + C \rightarrow 2CO$
H_2O
300
$H_2O_{(l)} \rightarrow H_2O_{(g)}$
CONDENSER
324
H_2
H_2O
322
334
312
316
328
$SnO_2 + 2CO \rightarrow Sn + 2CO_2$
330
CO
336

Fig. 3

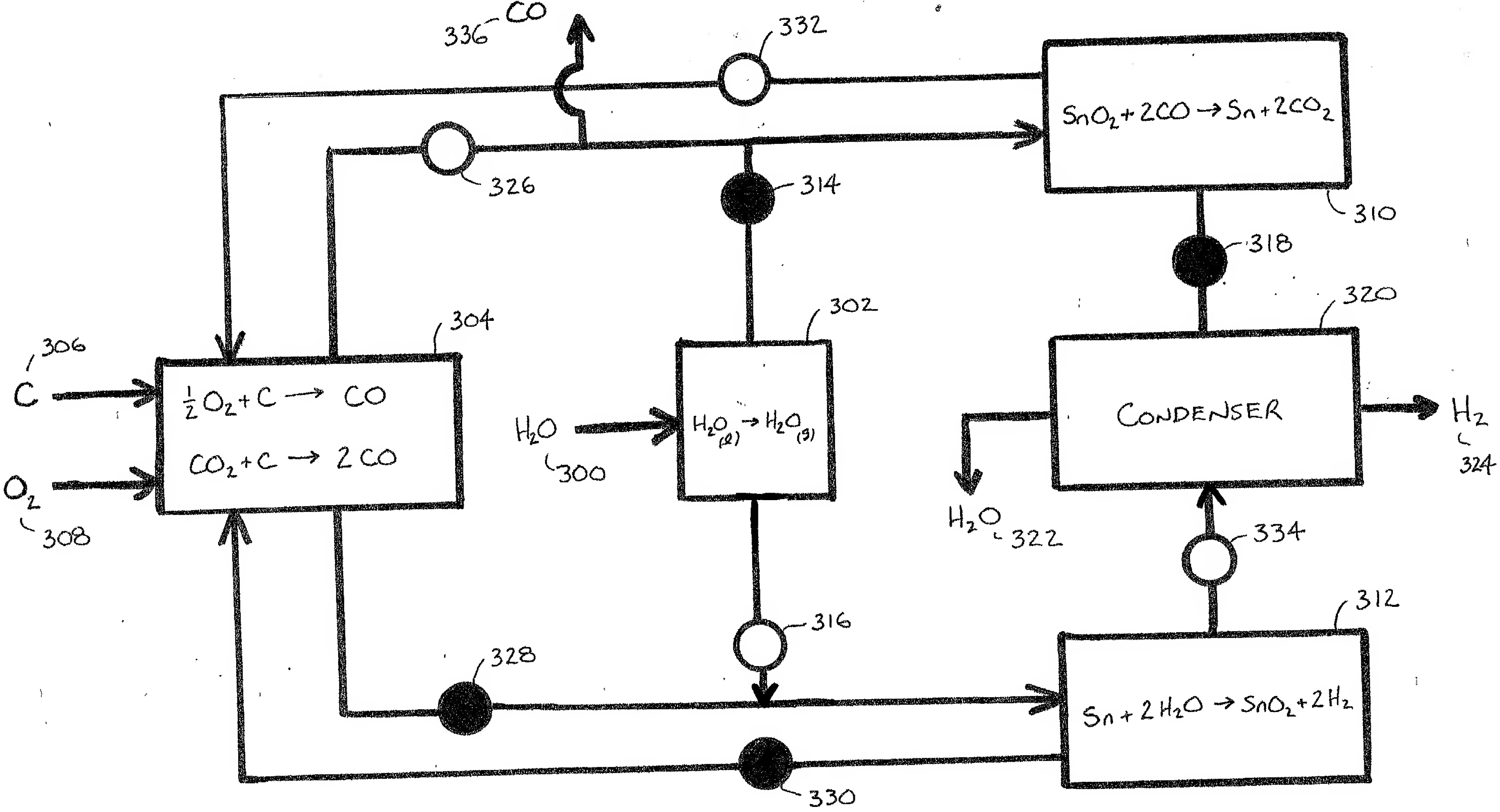
336
CO
332
326
314
310
318
320
302
304
306
C
O2
308
$\frac{1}{2}O_2 + C \rightarrow CO$
$CO_2 + C \rightarrow 2CO$
H2O
300
$H_2O_{(l)} \rightarrow H_2O_{(g)}$
$SnO_2 + 2CO \rightarrow Sn + 2CO_2$
CONDENSER
H2
324
H2O
322
334
312
316
328
$Sn + 2H_2O \rightarrow SnO_2 + 2H_2$
330

Fig. 4

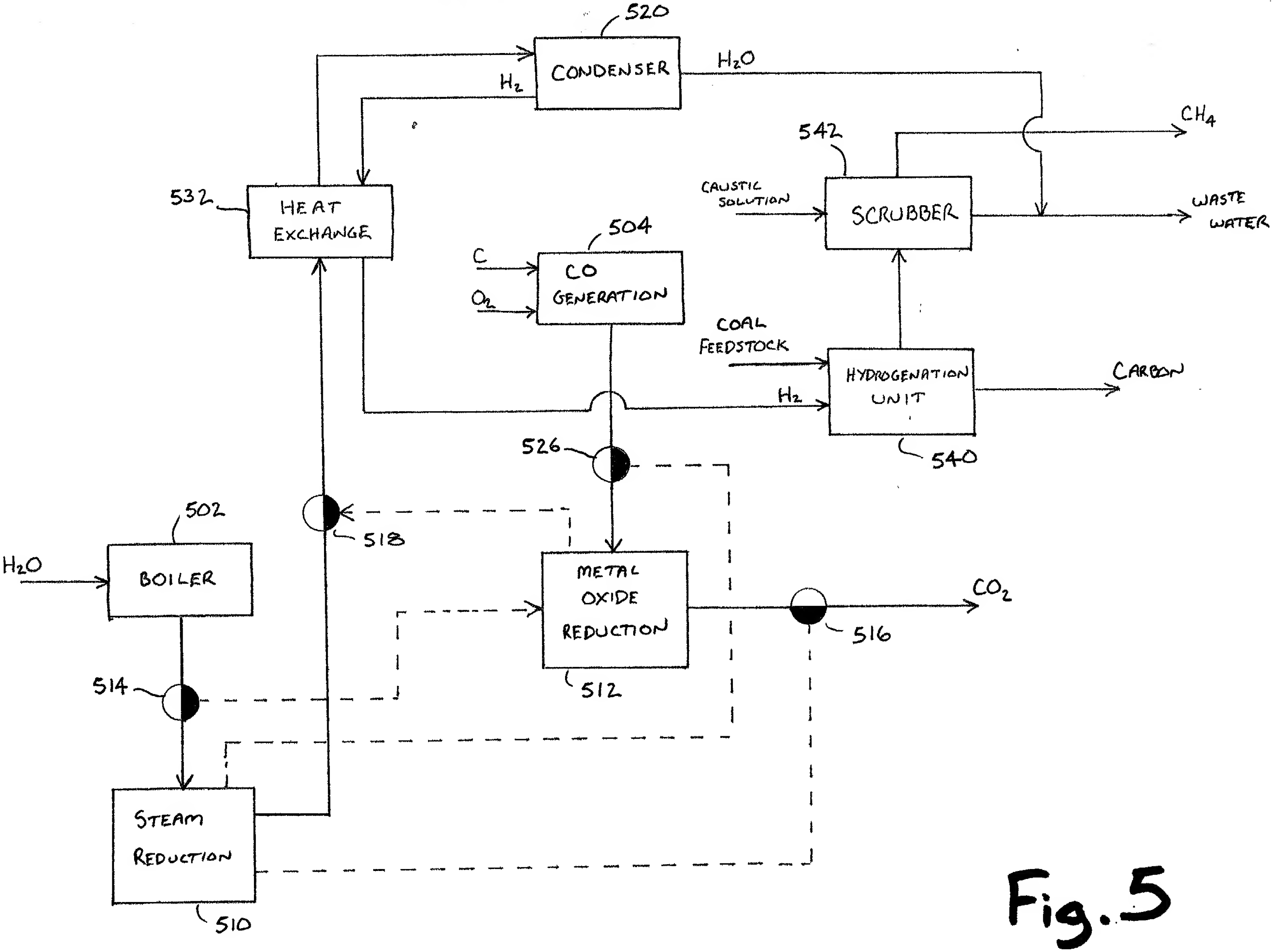
520
CONDENSER
H_2O
H_2
CH_4
542
532
HEAT EXCHANGE
CAUSTIC SOLUTION
SCRUBBER
WASTE WATER
504
C
CO GENERATION
O_2
COAL FEEDSTOCK
HYDROGENATION UNIT
CARBON
H_2
526
540
502
518
H_2O
BOILER
METAL OXIDE REDUCTION
CO_2
516
514
512
STEAM REDUCTION
510

Fig.5

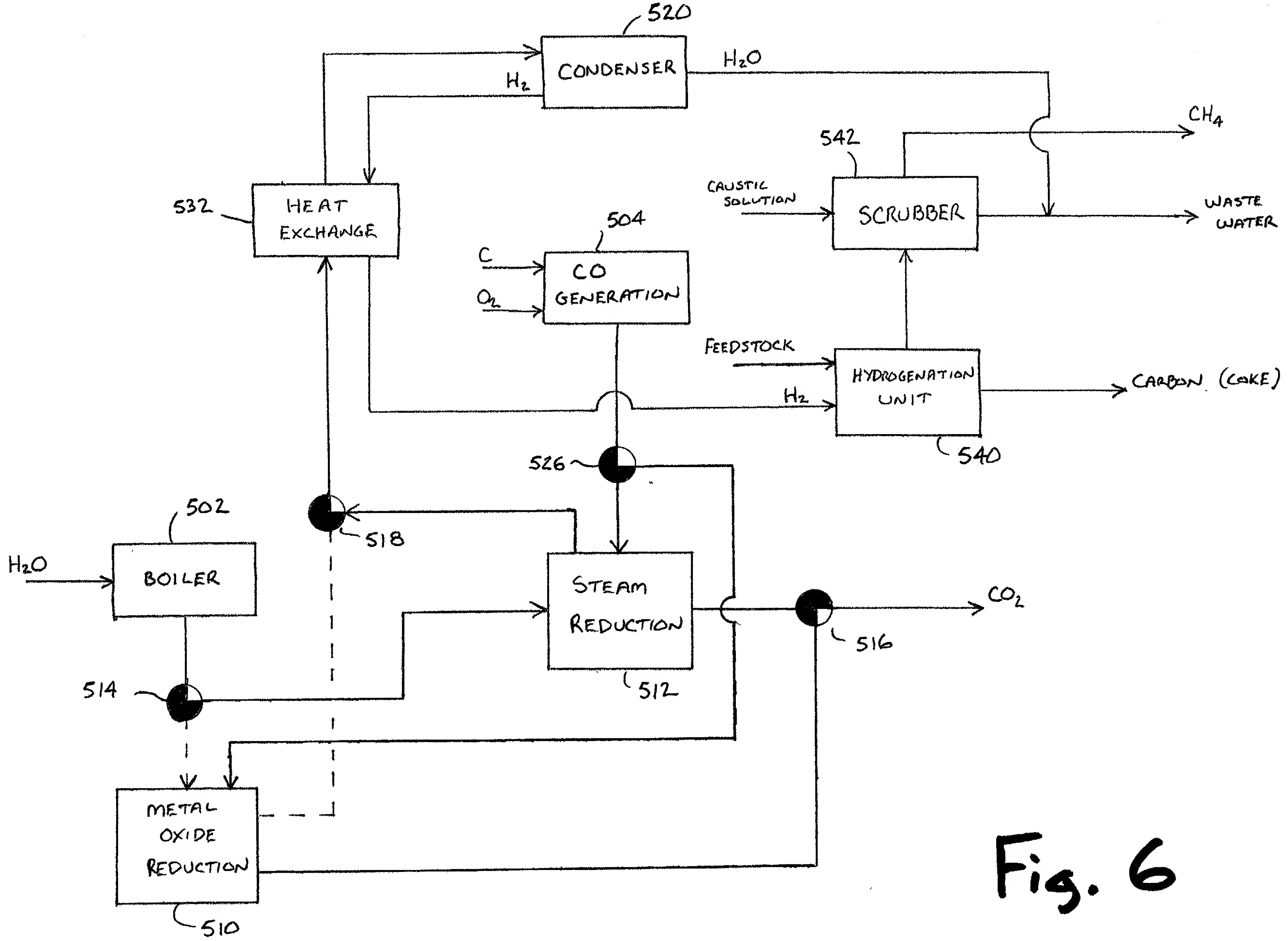
520
CONDENSER
H₂O
H₂
CH₄
542
CAUSTIC SOLUTION
SCRUBBER
WASTE WATER
532
HEAT EXCHANGE
504
C
O₂
CO GENERATION
FEEDSTOCK
H₂
HYDROGENATION UNIT
CARBON (COKE)
540
526
502
518
H₂O
BOILER
STEAM REDUCTION
CO₂
516
514
512
METAL OXIDE REDUCTION
510

Fig. 6

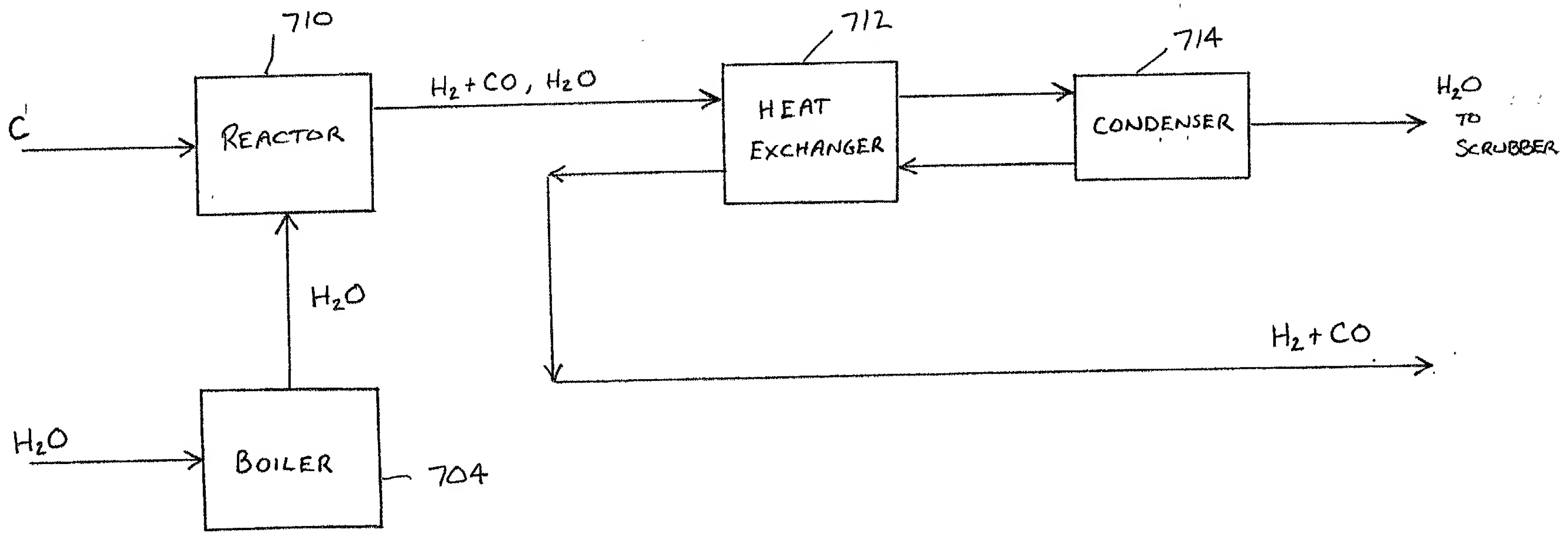
C
710
REACTOR
$H_2 + CO, H_2O$
712
HEAT EXCHANGER
714
CONDENSER
H_2O TO SCRUBBER
H_2O
$H_2 + CO$
H_2O
BOILER
704

Fig. 7

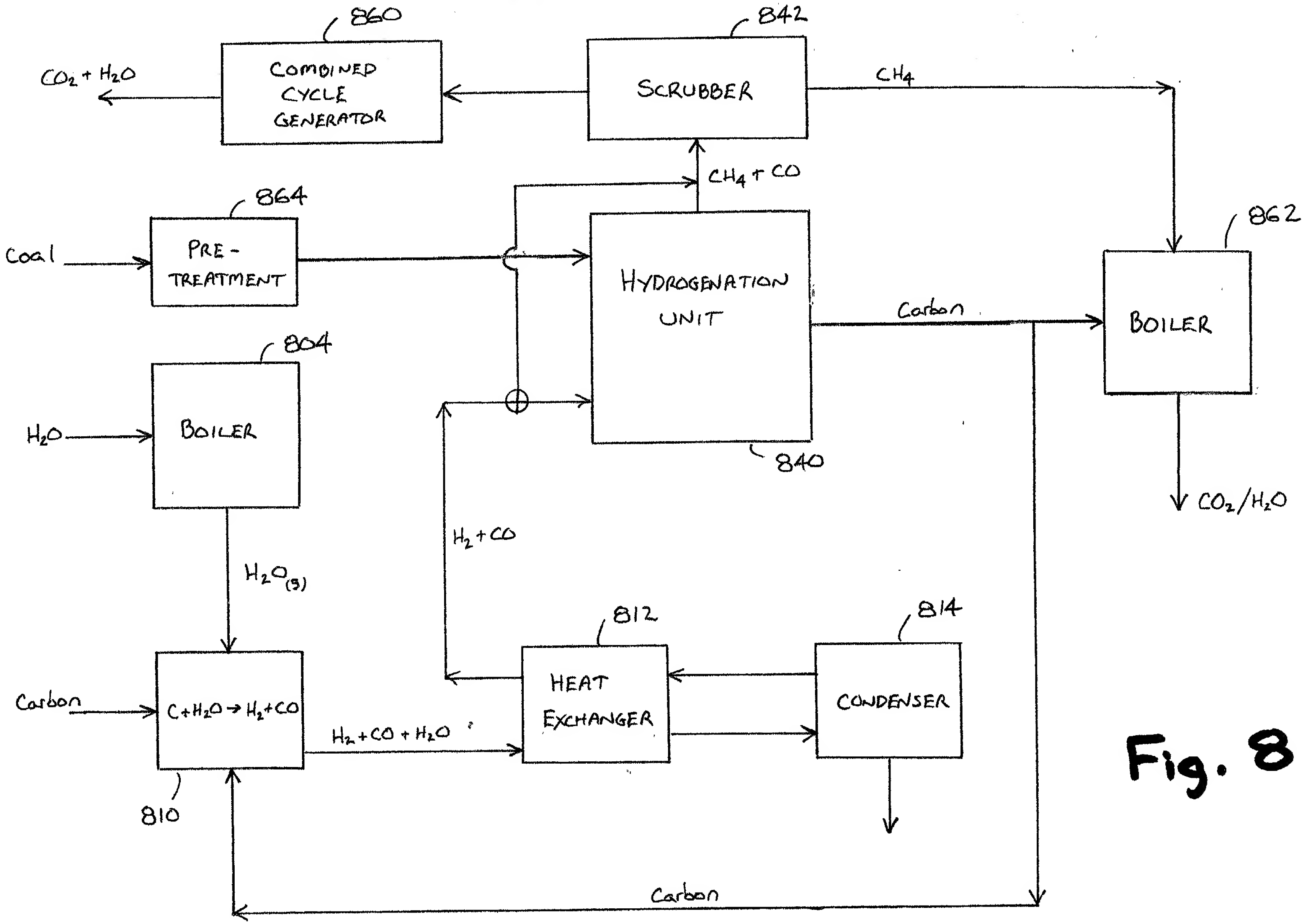
860
COMBINED CYCLE GENERATOR
$CO_2 + H_2O$
842
SCRUBBER
CH_4
$CH_4 + CO$
864
Coal
PRE-TREATMENT
840
HYDROGENATION UNIT
Carbon
862
BOILER
CO_2/H_2O
804
H_2O
BOILER
$H_2O_{(g)}$
$H_2 + CO$
810
Carbon
$C + H_2O \rightarrow H_2 + CO$
$H_2 + CO + H_2O$
812
HEAT EXCHANGER
814
CONDENSER
Carbon

Fig. 8